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BIOLOGICAL EVALUATIONS OF SOME MOUNTAIN
PINE BEETLE INFESTATIONS IN THE
CLEARWATER NATIONAL FOREST, IDAHO
IN 1960

Archibald Tunnock, Jr., Entomologist
Division of Forest Insect Research

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Prepared by the
Forest Insect Laboratory
Missoula, Montana

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PROBLEM

The mountain pine beetle (Dendroctonus monticolae Hopk.) has been a constant pest in certain areas of the Clearwater National Forest, Idaho since about 1934. The annual loss since 1952 has averaged nearly $2\frac{1}{2}$ percent of the trees in old-growth western white pine stands on the Canyon and Bungalow Ranger Districts. The Missoula Forest Insect Laboratory has recorded these infestations by surveying areas where the beetles are active. Laboratory personnel mapped heavily infested stands during an aerial survey of the Clearwater in August and, in September, visited these stands to evaluate the amount of damage and to determine trends of population.

BIOLOGICAL EVALUATION

One hundred western white pine trees infested with mountain pine beetle brood were sampled within the heavily infested areas spotted from the air. The following procedure was used:

1. The diameter of each infested tree at breast height was estimated and recorded as smaller, larger, or equal to the average stand diameter.
2. A record was made of injuries or conditions that occurred before beetle attack, such as snow breakage, prolonged infection by white pine blister rust (Cronartium ribicola Fischer), or lightning strikes.
3. One-half square foot of bark was removed at breast height from the cardinal sides of each infested tree, and the numbers of brood, natural enemies, and egg gallery starts in the cambium layer were recorded.

The data collected from sample trees were used to predict the probable number of trees that might be attacked by emerging beetles in 1961. The predicted number was determined by a biological index derived mathematically from a formula developed in 1939 for studies of mountain pine beetle behavior in western white pine stands. This index is based upon the probable survival of various beetle stadia, the sex ratio of the current population, and the expected mortality of adult beetles following emergence from host trees. Past observations show that this index may slightly overestimate the number of trees that will be attacked the following year, but that it has indicated infestation trends reliably.

RESULTS

The biological index for 1959 (table 1) predicted a decrease in the number of western white pine trees attacked during 1960 in parts of the Bungalow and Canyon Ranger Districts. A biological evaluation of the beetle infestation in these Districts indicated that there was a slight decrease in the number of trees infested during 1960. The prediction for 1961, based on results from the evaluation (table 1), is that the infestation will increase. The index figure 1.4 implies that for every 100 trees attacked in 1960 of average stand diameter, 140 will be infested in 1961.

Insects that prey on the mountain pine beetle found under the bark of sample trees belonged to three Orders: Hymenoptera (wasps), Coleoptera (beetles), and Diptera (flies). Together, they averaged 3.2 per square foot of infested bark surface in 1959, and this average increased to only 3.5 per square foot in 1960 (table 1).

Fifty-eight percent of the infested trees this season were infected, prior to attack, by white pine blister rust which killed the crowns. This percentage of rust-infected trees attacked was nearly in proportion with the percentage of rust-infected trees occurring in the stands. Results of past surveys indicate beetles reveal no preference for blister rust-infected timber.

DISCUSSION

Mountain pine beetle infestations that have been plaguing Bungalow and Canyon Ranger Districts have fluctuated very little in intensity during the past three years. Because of their relative stability and persistence, these infestations could be called chronically epidemic. As long as the old-growth western white pine forests remain undeveloped and natural control factors are at a low ebb, mountain pine beetles can be expected to continue to deplete this supply of virgin timber.

SUMMARY

A biological evaluation was made of some mountain pine beetle infestations in old-growth western white pine stands on the Canyon and Bungalow Ranger Districts of the Clearwater National Forest, Idaho, during September 1960. There was a slight decrease in the percentage of trees infested in these stands since 1959. The number of insects that prey on mountain pine beetle broods found under the bark of infested trees remained about the same. It is predicted that infestations will increase on these Districts in 1961.

Table 1.--Status and trend of mountain pine beetle infestations in white pine timber, Bungalow and Canyon Ranger Districts, Clearwater National Forest, Idaho from 1958 to 1960

	<u>1958</u>	<u>1959</u>	<u>1960</u>
Number of trees examined	5,402	5,687	3,351
Number of trees infested	104	101	104
Average percentage of trees infested (weighted)	2.43	2.45	2.26
Number of trees infected prior to attack	59	43	58
Number of natural enemies:			
Hymenopterous (wasps), per sq. ft. of bark	0.8	0.5	0.7
Coleopterous (beetles), per sq. ft. of bark	1.1	0.1	0.2
Dipterous (flies), per sq. ft. of bark	2.4	2.6	2.6
Total	4.3	3.2	3.5
Biological index	1.2	0.9	1.4
